

What is claimed is:

1. An injection molding apparatus for molding products comprising:

a first cavity chamber for forming a seal liner, the first cavity chamber having an

5 outer edge;

a second cavity chamber for forming a shell, the second cavity chamber being positioned adjacent to the first cavity chamber, the second cavity chamber having a center;

a first nozzle for a seal liner material positioned near the outer edge of the first cavity chamber, the first nozzle being in communication with the first cavity chamber;

10 a second nozzle for a shell material positioned near the center of the second cavity chamber, the second nozzle being in communication with the second cavity chamber; and

a mold core positioned in and moved between the first and second cavity chambers.

15 2. The injection molding apparatus of claim 1 wherein the mold core is rotationally moved between the first and second cavity chambers.

3. The injection molding apparatus of claim 1 further comprising a stripper plate positioned around the mold core for removing shells from the mold core.

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4. The injection molding apparatus of claim 1 wherein the mold core has an end opposite a base, the end having a seal liner portion for forming a seal liner cavity opening with

the first cavity chamber, and a shell portion for forming a shell cavity opening with the second cavity chamber.

5        5.        The injection molding apparatus of claim 1 wherein the first nozzle is connected  
to and in communication with a first melt distribution manifold, and the second nozzle is  
connected to and in communication with a second melt distribution manifold.

10        6.        The injection molding apparatus of claim 1 wherein the shell material comprises  
two different materials.

15        7.        The injection molding apparatus of claim 1 wherein the seal liner material  
comprises santoprene, and the shell material comprises polypropylene.

15        8.        The injection molding apparatus of claim 1 wherein the first nozzle has an angled  
tip.

9.        The injection molding apparatus of claim 1 wherein the first nozzle is thermal-  
gated and the second nozzle is valve-gated.

20        10.       An injection molding apparatus for molding products comprising:  
a first and a second seal liner cavity chamber for forming a seal liner, the first and  
second seal liner cavity chambers each having an outer edge;

a first and a second shell cavity chamber for forming a shell over the seal liner, the first shell cavity chamber being adjacent to the first seal liner cavity chamber, the second shell cavity chamber being adjacent to the second seal liner cavity chamber, the first and second shell cavity chambers each having a center;

5 a first and a second offset nozzle for a seal liner material, the first offset nozzle being positioned near the outer edge of the first seal liner cavity chamber, the first offset nozzle also being in communication with the first seal liner cavity chamber, the second offset nozzle positioned near the outer edge of the second seal liner cavity chamber, the second offset nozzle also being in communication with the second seal liner cavity chamber;

10 a first and a second center nozzle for a shell material, the first center nozzle being positioned near the center of the first shell cavity chamber, the first center nozzle also being in communication with the first shell cavity chamber, the second center nozzle positioned near the center of the second shell cavity chamber, the second center nozzle also being in communication with the second shell cavity chamber; and

15 a first, a second, a third, and a fourth mold core, the first mold core capable of being positioned in and moved between the first seal liner cavity chamber and the second shell cavity chamber, the second mold core capable of being positioned in and moved between the first shell cavity chamber and the first seal liner cavity chamber, the third mold core capable of being positioned in and moved between the second seal liner cavity chamber and the first shell  
20 cavity chamber, and the fourth mold core capable of being positioned in and moved between the second shell cavity chamber and the second seal liner cavity chamber.

11. The injection molding apparatus of claim 10 wherein each mold core is rotationally moved between the cavity chambers.

12. The injection molding apparatus of claim 10 further comprising a stripper plate  
5 positioned around the mold core for removing shells from the mold core.

13. The injection molding apparatus of claim 10 wherein each mold core has an end opposite a base, the end having a seal liner portion for forming a seal liner cavity opening with the first cavity chamber, and a shell portion for forming a shell cavity opening with the second  
10 cavity chamber.

14. The injection molding apparatus of claim 10 wherein the first and second offset nozzles are connected to and in communication with a first melt distribution manifold, and the first and second center nozzles are connected to and in communication with a second melt  
15 distribution manifold.

15. The injection molding apparatus of claim 10 wherein the shell material comprises two different materials.

20 16. The injection molding apparatus of claim 10 wherein the seal liner material comprises santoprene, and the shell material comprises polypropylene.

17. The injection molding apparatus of claim 10 wherein the first and second offset nozzles each have an angled tip.

18. The injection molding apparatus of claim 10 wherein the first and second offset  
5 nozzles are thermal-gated, and the first and second center nozzles are valve-gated.

19. The injection molding apparatus of claim 10 wherein seal liners are formed on the first and third mold cores at about the same time as shells are formed on the second and fourth mold cores, and seal liners are formed on the second and fourth mold cores at about the same  
10 time as shells are formed on the first and third mold cores.

20. In combination with an injection molding machine having at least a first material and a second material, an injection molding apparatus comprising:

a first cavity chamber for forming a seal liner, the first cavity chamber having an  
15 outer edge;

a second cavity chamber for forming a shell, the second cavity chamber being adjacent to the first cavity chamber, the second cavity chamber having a center;

a first melt distribution manifold having a first material melt passage connected to and in communication with a first material injection entry, the first material injection entry being  
20 connected to and in communication with the first material of the injection molding machine;

a second melt distribution manifold having a second material melt passage connected to and in communication with a second material injection entry, the second material

injection entry being connected to and in communication with the second material of the injection molding machine;

a first nozzle positioned near the outer edge of the first cavity chamber, the first nozzle being in communication with the first cavity chamber and the first material melt passage;

5 a second nozzle positioned near the center of the second cavity chamber, the second nozzle being in communication with the second cavity chamber and the second material melt passage; and

a mold core positioned in and moved rotationally between the first and second cavity chambers.

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21. A method for injection molding of products comprising the steps of:

moving a mold core into a first cavity chamber with an outer edge to form a seal liner cavity opening;

15 injecting seal liner material from a first nozzle positioned near the outer edge of the first cavity chamber into the seal liner cavity opening to form a seal liner on the mold core;

moving the mold core and the seal liner into a second cavity chamber with a center to form a shell cavity opening, the second cavity chamber being adjacent to the first cavity chamber; and

20 injecting shell material from a second nozzle positioned near the center of the second cavity chamber into the shell cavity opening to form a shell on the mold core and the seal liner.

22. The method of claim 21 further comprising the step rotationally moving the mold core between the first and second cavity chambers.

23. The method of claim 21 further comprising the step of removing shells from the  
5 mold core with a stripper plate positioned around the mold core.

24. The method of claim 21 further comprising the steps connecting the first nozzle to a first melt distribution manifold, and connecting the second nozzle to a second melt distribution manifold.

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25. The method of claim 21 wherein the shell material comprises two different materials.

26. The method of claim 21 wherein the seal liner material comprises santoprene, and  
15 the shell material comprises polypropylene.

27. The method of claim 21 wherein the first nozzle has an angled tip.

28. The method of claim 21 wherein the first nozzle is thermal-gated and the second  
20 nozzle is valve-gated.